CBMS837

Biochemistry and Cell Biology

S2 Day 2017

Dept of Chemistry & Biomolecular Sciences

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Disclaimer

Macquarie University has taken all reasonable measures to ensure the information in this publication is accurate and up-to-date. However, the information may change or become out-dated as a result of change in University policies, procedures or rules. The University reserves the right to make changes to any information in this publication without notice. Users of this publication are advised to check the website version of this publication [or the relevant faculty or department] before acting on any information in this publication.

General Information

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Credit points
4

Prerequisites
Admission to MBiotech or MBiotechMCom or MBioBus or MLabQAMgt or MRadiopharmSc or MSc

Corequisites

Co-badged status
CBMS337

Unit description
Biochemistry and cell biology are central to our understanding of medicine and biotechnology. Advances in these fields are dependent on an advanced understanding of the molecular basis of diverse cellular processes. This unit links important biochemical processes to functions and properties of eukaryotic cells. We explore advanced concepts including: enzyme function, properties of membranes, signal transduction, protein trafficking and transport, and protein turnover. These are linked to whole cell behaviours such as cell division and differentiation, programmed cell death, and general responses to external stimuli. Practical work complements lecture material and provides experience with a broad range of current techniques used in research and industry. Laboratory techniques used include analysis of signalling cascades, spectrophotometry, and fluorescence and light microscopy.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at https://www.mq.edu.au/study/calendar-of-dates

Learning Outcomes

On successful completion of this unit, you will be able to:

Demonstrate an understanding of how eukaryotic cells are studied and summarise current knowledge of internal cell organisation, membrane trafficking, intracellular compartments, biochemical pathways, and intra- and extra-cellular signalling.

Summarise the major eukaryotic cell regulation control points and how disturbances in these processes are involved in human disease.

Design and execute laboratory experiments to characterise, quantitate and measure a range of fundamental cell processes.

Critically analyse and communicate advanced molecular, cellular, and biochemical concepts from the primary literature in both verbal and written form.

Synthesise existing scientific data for communication to a wider scientific and lay community.

General Assessment Information

Please refer to the Macquarie University Assessment policy regarding submission of assignments, plagarism, extensions, late submissions, etc.

Individual assessment criteria/marking rubrics can be found on the CBMS337/837 iLearn site.

Late Submissions

Tasks 10% or less - No extensions will be granted. Students who have not submitted the task

prior to the deadline will be awarded a mark of 0 for the task. This penalty does not apply for cases in which an application for disruption of studies is made and approved. No submission will be accepted after solutions have been posted.

Tasks above 10% - No extensions will be granted. There will be a deduction of 10% of the total available marks made from the total awarded mark for each 24 hour period or part thereof that the submission is late (for example, 25 hours late in submission – 20% penalty). This penalty does not apply for cases in which an application for disruption of studies is made and approved. No submission will be accepted after solutions have been posted.

Assessment Tasks

Name	Weighting	Hurdle	Due
Quiz	7%	No	Week 3
Enzyme Kinetics Prac Report #1	7%	No	Week 6
Enzyme Kinetics Prac Report #2	3%	No	Week 7
Mid-Semester Exam	18%	No	Week 7
Human Protein Review	10%	No	Week 9
Protein Localisation LabReport	15%	No	Week 10
Phosphorylation Lab Report	5%	No	Weeks 11/12
Hot Topics Seminar	8%	No	Weeks 11/12
Final Exam	27%	No	University Examination Period

Quiz

Due: **Week 3**
Weighting: **7%**

An early quiz on material covered in weeks 1-3. In-class hard-copy written assessment.

On successful completion you will be able to:

- Demonstrate an understanding of how eukaryotic cells are studied and summarise current knowledge of internal cell organisation, membrane trafficking, intracellular compartments, biochemical pathways, and intra- and extra-cellular signalling.
- Summarise the major eukaryotic cell regulation control points and how disturbances in these processes are involved in human disease.

Enzyme Kinetics Prac Report #1

Due: **Week 6**
Weighting: **7%**

Students will graph and analyze enzyme kinetics data. They will need to identify enzymatic mechanism and determine the kinetic constants.

On successful completion you will be able to:

- Design and execute laboratory experiments to characterise, quantitate and measure a range of fundamental cell processes.

Enzyme Kinetics Prac Report #2

Due: **Week 7**
Weighting: **3%**

Students will graph and analyze enzyme kinetics data. They will need to identify enzymatic mechanism and determine the kinetic constants.

On successful completion you will be able to:

- Design and execute laboratory experiments to characterise, quantitate and measure a range of fundamental cell processes.

Mid-Semester Exam

Due: **Week 7**
Weighting: **18%**

A written exam covering all materials and textbook readings associated with lectures 1-13. This assessment will be designed to give you specific feedback on your understanding of the topics up to this stage in the unit. In-class hard-copy written assessment.

On successful completion you will be able to:

- Demonstrate an understanding of how eukaryotic cells are studied and summarise current knowledge of internal cell organisation, membrane trafficking, intracellular compartments, biochemical pathways, and intra- and extra-cellular signalling.
- Summarise the major eukaryotic cell regulation control points and how disturbances in these processes are involved in human disease.

Human Protein Review

Due: **Week 9**
Weighting: **10%**

This assessment will involve researching and writing a scientific review of the sum of current scientific knowledge for one human protein. The review will be communicated to a wider scientific and lay audience through an online database.

On successful completion you will be able to:

- Demonstrate an understanding of how eukaryotic cells are studied and summarise current knowledge of internal cell organisation, membrane trafficking, intracellular compartments, biochemical pathways, and intra- and extra-cellular signalling.
- Summarise the major eukaryotic cell regulation control points and how disturbances in these processes are involved in human disease.
- Critically analyse and communicate advanced molecular, cellular, and biochemical concepts from the primary literature in both verbal and written form.
- Synthesise existing scientific data for communication to a wider scientific and lay community.

Protein Localisation LabReport

Due: **Week 10**
Weighting: **15%**

A scientific report of the results from practicals 2, 3, 7, 8. The report will be written in the form of a peer reviewed journal article. Handed in via Turnitin.

On successful completion you will be able to:

- Demonstrate an understanding of how eukaryotic cells are studied and summarise current knowledge of internal cell organisation, membrane trafficking, intracellular compartments, biochemical pathways, and intra- and extra-cellular signalling.
- Summarise the major eukaryotic cell regulation control points and how disturbances in these processes are involved in human disease.
- Design and execute laboratory experiments to characterise, quantitate and measure a range of fundamental cell processes.
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Phosphorylation Lab Report

Due: **Weeks 11/12**
Weighting: **5%**

A short report analysing the results from practicals 9 and 10 regarding changes to cellular protein phosphorylation patterns in response to a chemical. Handed in via iLearn.

On successful completion you will be able to:

- Demonstrate an understanding of how eukaryotic cells are studied and summarise current knowledge of internal cell organisation, membrane trafficking, intracellular compartments, biochemical pathways, and intra- and extra-cellular signalling.
- Summarise the major eukaryotic cell regulation control points and how disturbances in these processes are involved in human disease.
- Design and execute laboratory experiments to characterise, quantitate and measure a range of fundamental cell processes.
- Critically analyse and communicate advanced molecular, cellular, and biochemical concepts from the primary literature in both verbal and written form.

Hot Topics Seminar

Due: **Weeks 11/12**
Weighting: **8%**

Prepare and present a short oral presentation (seminar) on a "hot topic" in cell biology and/or biochemistry.

On successful completion you will be able to:

- Demonstrate an understanding of how eukaryotic cells are studied and summarise current knowledge of internal cell organisation, membrane trafficking, intracellular compartments, biochemical pathways, and intra- and extra-cellular signalling.
- Summarise the major eukaryotic cell regulation control points and how disturbances in these processes are involved in human disease.
- Critically analyse and communicate advanced molecular, cellular, and biochemical concepts from the primary literature in both verbal and written form.

Final Exam

Due: **University Examination Period**
Weighting: **27%**

This assessment is designed to test understanding of topics presented in all of the lectures and practicals, and to evaluate the student's ability to apply this knowledge to new problems. Hard-copy 3 hour written exam.

On successful completion you will be able to:

- Demonstrate an understanding of how eukaryotic cells are studied and summarise current knowledge of internal cell organisation, membrane trafficking, intracellular

compartments, biochemical pathways, and intra- and extra-cellular signalling.
- Summarise the major eukaryotic cell regulation control points and how disturbances in these processes are involved in human disease.

Delivery and Resources

Required Text

B. Alberts, A. Johnson, J. Lewis, M. Raff, K. Roberts, P. Walter (2015) "Molecular Biology of the Cell" (6th Edition), ISBN 978-0815344322. Available at the Co-op and a few copies for reference in the library.

Your lectures will cover parts of many chapters from this text and your success in the unit will be greatly enhanced by having this textbook.

Unit Web Page

The web page for this unit is at Macquarie University's iLearn site accessed here.

The iLearn site for CBMS337/837 will be used to deliver lecture and laboratory notes and will feature a discussion forum, digital lecture recordings and other learning resources. To view the lecture notes and other PDF files on the website, you will require a PDF viewer. Free PDF viewers can be found online (e.g. Adobe Reader).

Active Learning Platform

Some lectures will feature interactive lecture presentations using a technology called the Echo360 Active Learning Platform. This is a new system, different from Lecture Tools which you may be more familiar with. Additionally, this technology is **different** from the Echo360 **Lecture Recordings** you may be more familiar with.

To participate in the Active Learning Platform the student will need to bring their laptop, tablet, or smart phone to class, or participate while live-streaming the class (if this service is available).

Guides and videos on how to use the Active Learning Platform can be found here.

Active Learning Platform - Getting Started

http://help.echo360.org/#t=Student_Guide%2FGetting_Students_Started.htm%23bc-1&rhtocid=2.0_1

During Class

A video guide to using the Active Learning Platform during class

https://vimeo.com/album/3456016/video/125803882

Viewing a presentation

http://help.echo360.org/#t=Student_Guide%2FViewing_Classes.htm

Responding to interactive slides

http://help.echo360.org/#t=Student_Guide%2FAnswering_Questions_Class.htm

Taking notes

http://help.echo360.org/#t=Student_Guide%2FTaking_Notes.htm

Posting a question

http://help.echo360.org/#t=Student_Guide%2FPosting_Questions_About_Class_Presentations.htm

Responding to a question

http://help.echo360.org/#t=Student_Guide%2FResponding_to_Questions_about_Class_Presentations.htm

Flagging confusion slides and bookmarking

http://help.echo360.org/#t=Student_Guide%2FFlagging_Bookmarking_Content.htm

After Class

After class video guide

https://vimeo.com/album/3456016/video/125735236

Review personal study guide (student notes and bookmarks)

http://help.echo360.org/#t=Student_Guide%2FReviewing_Study_Guide.htm

Questions and answers

http://help.echo360.org/#t=Student_Guide%2FParticipate_in_Class_Q_A.htm

Downloading notes

http://help.echo360.org/#t=Student_Guide%2FDownloading_Notes.htm

Echo360 Lecture Recordings

All lectures (but not pracs) will be recorded using the Echo360 Lecture Recording technology. A guide to this technology is available here. The Echo360 recordings can be accessed from the Echo360 Active Learning Platform block on the right side of the CBMS337/837 iLearn page.

Learning and Teaching Activities

Lectures

Lectures from staff in CBMS summarising a wide range of advanced topics in eukaryotic cell biology and biochemistry. You are highly encouraged to attend lectures in person. Past experience has shown that students who attend lectures tend to receive higher marks in the unit.

Practicals

Practicals give you an opportunity to put into practice your knowledge of biochemistry and cell biology and to develop real laboratory skills that are valued in academic and industry professions.

Self-Study

To succeed in this unit you are expected to spend time outside formal instruction reading assigned sections of the textbook, reviewing notes taken in class, and exploring other sources of information on advanced biochemistry and cell biology. To self-assess your degree of understanding and to practice problem solving skills you are expected to attempt problems from the text and other resources.

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central. Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy http://mq.edu.au/policy/docs/academic_honesty/policy.html

Assessment Policy http://mq.edu.au/policy/docs/assessment/policy_2016.html

Grade Appeal Policy http://mq.edu.au/policy/docs/gradeappeal/policy.html

Complaint Management Procedure for Students and Members of the Public http://www.mq.edu.au/policy/docs/complaint_management/procedure.html

Disruption to Studies Policy (in effect until Dec 4th, 2017): http://www.mq.edu.au/policy/docs/disruption_studies/policy.html

Special Consideration Policy (in effect from Dec 4th, 2017): https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policies/special-consideration

In addition, a number of other policies can be found in the Learning and Teaching Category of Policy Central.

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/support/student_conduct/

Results

Results shown in *iLearn*, or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in eStudent. For more information visit ask.mq.edu.au.

Student Support

Macquarie University provides a range of support services for students. For details, visit http://students.mq.edu.au/support/

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to improve your marks and take control of your study.

- Workshops
- StudyWise
- Academic Integrity Module for Students
- Ask a Learning Adviser

Student Services and Support

Students with a disability are encouraged to contact the Disability Service who can provide appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/.

When using the University's IT, you must adhere to the Acceptable Use of IT Resources Policy. The policy applies to all who connect to the MQ network including students.

Graduate Capabilities

PG - Capable of Professional and Personal Judgment and Initiative

Our postgraduates will demonstrate a high standard of discernment and common sense in their professional and personal judgment. They will have the ability to make informed choices and decisions that reflect both the nature of their professional work and their personal perspectives.

This graduate capability is supported by:

Learning outcomes

- Design and execute laboratory experiments to characterise, quantitate and measure a range of fundamental cell processes.
- Critically analyse and communicate advanced molecular, cellular, and biochemical concepts from the primary literature in both verbal and written form.
- Synthesise existing scientific data for communication to a wider scientific and lay community.

Assessment tasks

- Enzyme Kinetics Prac Report #1
- Enzyme Kinetics Prac Report #2
- Human Protein Review
- Protein Localisation LabReport
- Phosphorylation Lab Report
- Hot Topics Seminar

PG - Discipline Knowledge and Skills

Our postgraduates will be able to demonstrate a significantly enhanced depth and breadth of knowledge, scholarly understanding, and specific subject content knowledge in their chosen fields.

This graduate capability is supported by:

Learning outcomes

- Demonstrate an understanding of how eukaryotic cells are studied and summarise current knowledge of internal cell organisation, membrane trafficking, intracellular compartments, biochemical pathways, and intra- and extra-cellular signalling.
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- Hot Topics Seminar
- Final Exam

PG - Critical, Analytical and Integrative Thinking

Our postgraduates will be capable of utilising and reflecting on prior knowledge and experience, of applying higher level critical thinking skills, and of integrating and synthesising learning and knowledge from a range of sources and environments. A characteristic of this form of thinking is the generation of new, professionally oriented knowledge through personal or group-based critique of practice and theory.

This graduate capability is supported by:

Learning outcomes

- Demonstrate an understanding of how eukaryotic cells are studied and summarise current knowledge of internal cell organisation, membrane trafficking, intracellular compartments, biochemical pathways, and intra- and extra-cellular signalling.
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PG - Research and Problem Solving Capability

Our postgraduates will be capable of systematic enquiry; able to use research skills to create new knowledge that can be applied to real world issues, or contribute to a field of study or practice to enhance society. They will be capable of creative questioning, problem finding and problem solving.

This graduate capability is supported by:

Learning outcomes

- Design and execute laboratory experiments to characterise, quantitate and measure a range of fundamental cell processes.
- Critically analyse and communicate advanced molecular, cellular, and biochemical concepts from the primary literature in both verbal and written form.
- Synthesise existing scientific data for communication to a wider scientific and lay community.

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- Hot Topics Seminar

PG - Effective Communication

Our postgraduates will be able to communicate effectively and convey their views to different social, cultural, and professional audiences. They will be able to use a variety of technologically supported media to communicate with empathy using a range of written, spoken or visual formats.

This graduate capability is supported by:

Learning outcomes

- Demonstrate an understanding of how eukaryotic cells are studied and summarise current knowledge of internal cell organisation, membrane trafficking, intracellular compartments, biochemical pathways, and intra- and extra-cellular signalling.
- Summarise the major eukaryotic cell regulation control points and how disturbances in these processes are involved in human disease.
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- Hot Topics Seminar
- Final Exam

PG - Engaged and Responsible, Active and Ethical Citizens

Our postgraduates will be ethically aware and capable of confident transformative action in relation to their professional responsibilities and the wider community. They will have a sense of connectedness with others and country and have a sense of mutual obligation. They will be able to appreciate the impact of their professional roles for social justice and inclusion related to national and global issues

This graduate capability is supported by:

Learning outcome

- Synthesise existing scientific data for communication to a wider scientific and lay community.

Assessment task

- Human Protein Review

Changes from Previous Offering

The 2017 offering of this unit will feature several changes from the 2016 offering. These changes include: two additional assessment tasks, changes to the content of several of the practical labs, change to lecturers.